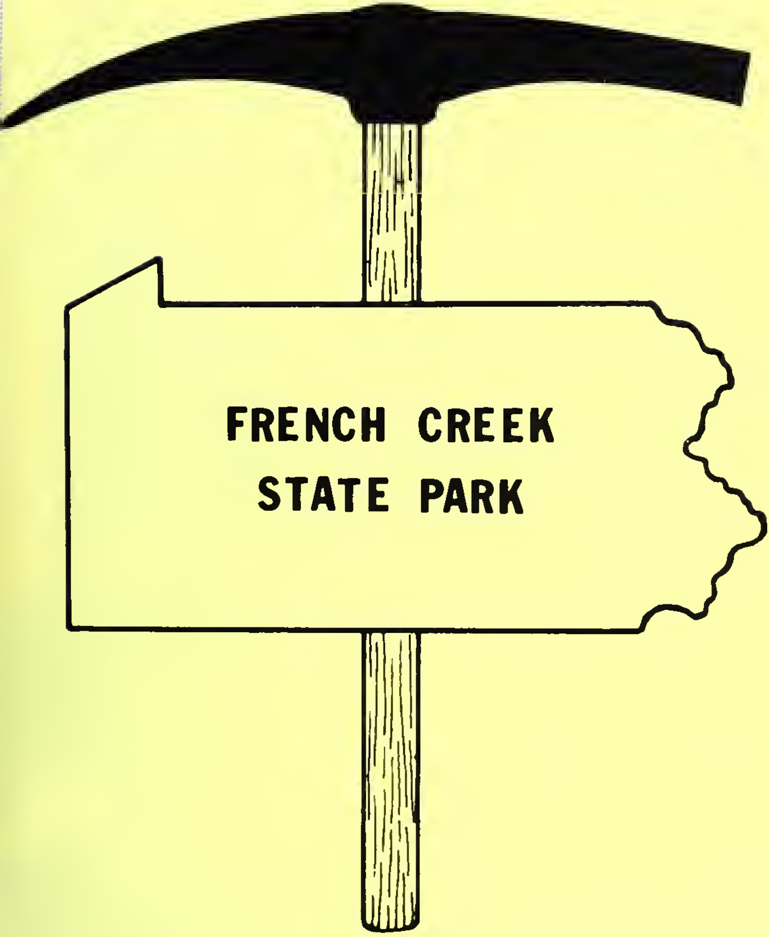
PARK GUIDE 6

FEB 1988

PENNSYLVANIA
TRAIL OF GEOLOGY



# FRENCH CREEK STATE PARK

# STORY OF THE ROCKS

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# THE GEOLOGIC STORY

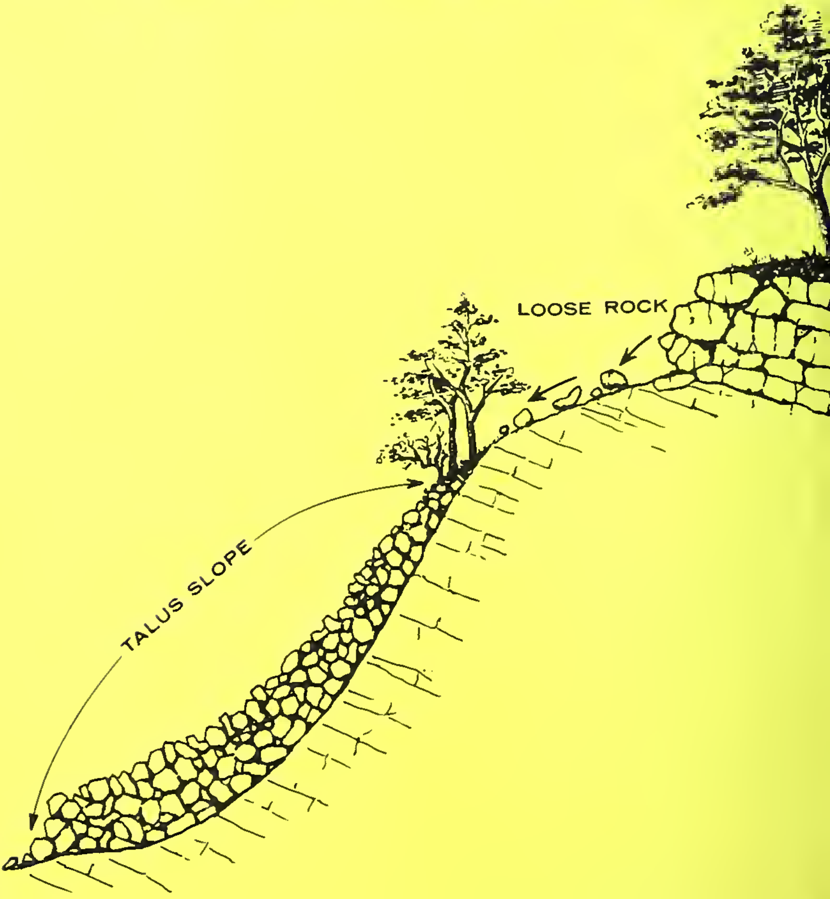
French Creek State Park includes more than 6,000 acres of wilderness in densely populated southeastern Pennsylvania.

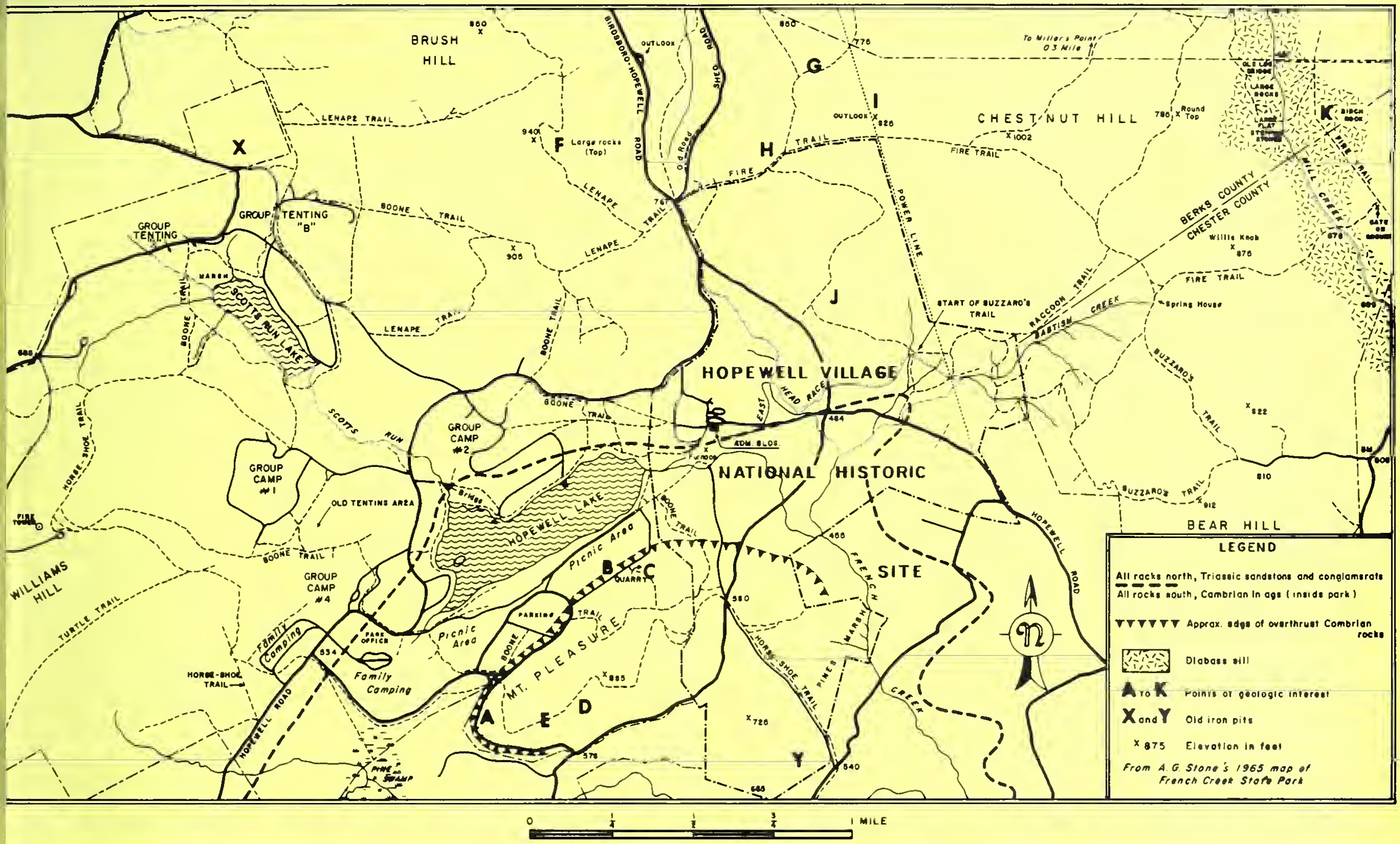
Six types of rock are found in the park. They include representatives from each of the three major rock groups; igneous, sedimentary, and metamorphic.

The igneous rocks are ***diabase*** and ***gabbro***. These were formed from molten lava that cooled below the earth's surface.

Sedimentary rocks are present in the form of ***sandstone*** and ***conglomerate***. Some of the sandstone and conglomerate was deposited by streams from former near-by mountains, other sandstone and conglomerate in the park area was deposited as sand and gravel in an ancient sea which once covered this region. Some of the sandstone and conglomerate has been changed into the metamorphic rocks known as ***quartzite*** and ***quartzite conglomerate*** by pressure from within the earth.

These rocks, ranging from about 600 million to 200 million years in age, form the scenery and areas of geologic interest in and around French Creek State Park.





Point **A**, on the map, is located about 500 feet south of the entrance to Hopewell Lake bathing area. Here a layer of ***quartzite conglomerate*** may be seen on the east side of the road. This quartzite conglomerate and some quartzite layers form Mt. Pleasure. The quartzite conglomerate is composed of rounded quartz pebbles and boulders cemented together by finer-grained quartzite.

Another exposure of the quartzite conglomerate may be seen at **B** at the foot of the north slope of Mt. Pleasure on the road that trends northeast from the parking lot area. Here the conglomerate is disintegrating due to the geologic process of ***weathering***.

Area **C** is just a short distance east of **B**. This area is a good example of how rock weathers and falls from a steep slope to form a feature called a ***talus slope*** (see drawing). Near the top of the talus slope there are trees growing between the rocks. The trees are up to six inches in diameter, and growing straight. The trees indicate that the talus slope has been here a long time, and the fact that they are straight shows that there has been little or no movement of the rocks.

There are two areas of geologic interest on the southern side of Mt. Pleasure. At **D** there is a black and white rock. This rock is a slab of dark quartzite. One side of the slab is occupied by a white quartz vein about twelve inches wide. Note how neat and sharp the contact is between the vein and the rock and how the quartz is banded parallel to the contact. These features indicate that the quartz entered the rock in liquid form and filled existing cracks or fractures. The quartzite next to the quartz vein is not made of the usual clear and blue grains, but is black and gray indicating that the rock was altered by the quartz solution that filled the crack.

Area **E** is a flat area where large quartzite boulders have accumulated. This boulder field represents an old rock ledge that has been broken down by weathering processes;

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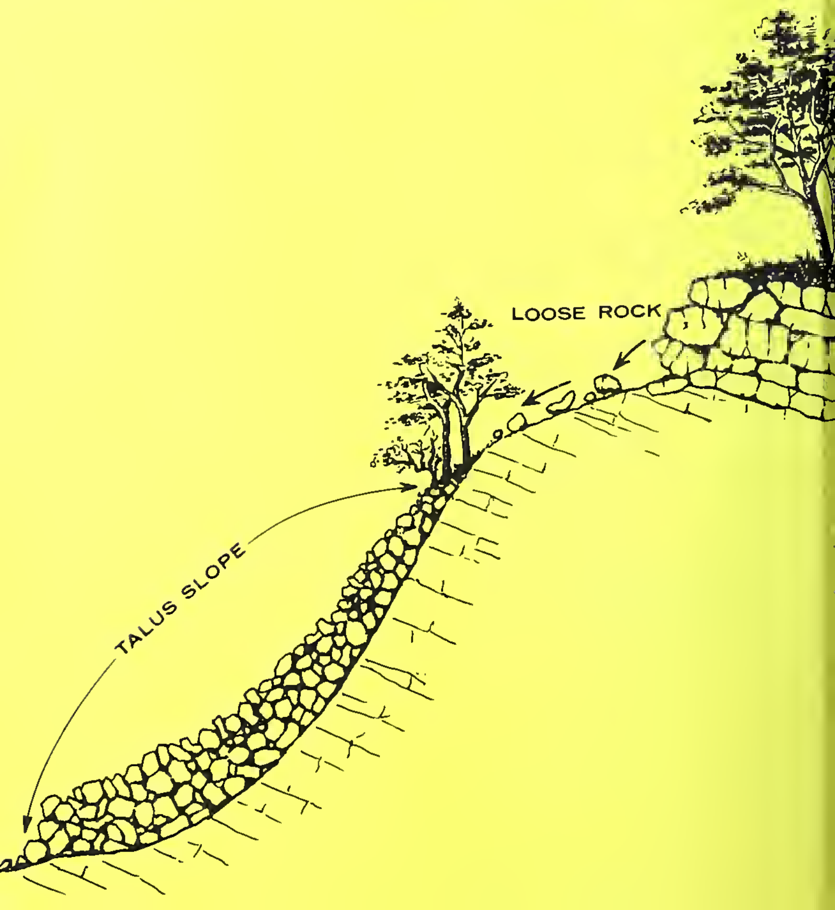

the boulders are slowly moving downhill under the force of gravity.

To find remnants of the igneous rock ***gabbro***, visit the south side of the paved road along the southern slopes of Mt. Pleasure. Gabbro occurs here as rusty, round, hard boulders made up of the following minerals; plagioclase feldspar, hornblende, pyroxene, and some quartz and biotite mica.

The deposition of sand and gravel, which became the sandstone and conglomerate of the area, took place at the time of dinosaurs. A few fossil tracks and trails have been found in areas outside the park that contain similar deposits of the same age. Thus, it is reasonable to assume that when sand and gravel were being deposited in the area of French Creek State Park, dinosaurs were fording the gravelly streams and walking across the sand banks.

The summit of Williams Hill, including the picnic ground and firetower is strewn with boulders. The surface of the boulders is gray but inside the rock is sandstone made up of fine quartz grains with a few quartz pebbles.

On the southern edge of the summit of Brush Hill, there is a boulder field at **F**. Here the red sandstone boulders contain a few quartz pebbles derived from the southern edge of the rock layer that supports the hilltop. These are residual boulders on a gentle slope; they are slowly being broken down by weathering and will eventually creep down the hillside by the force of gravity.

Points **G** and **H** on Chestnut Hill are on a flat bench-like area which is underlain by conglomerate consisting of quartz pebbles and rock fragments within light-colored quartz sandstone.

Area **I** is a large boulder field. The smaller boulders are red sandstone, and the large boulders are conglomerate containing an abundance of quartz pebbles.

The rocks found on the peak of Chestnut Hill are hard, reddish sandstones.

Picnic Rock is a large, flat-topped, table-like, boulder located at **J**. The boulder is conglomerate containing pebbles up to three inches in diameter. There are a few other picnic-type rocks in the area. On the slope below Picnic Rock, there is sandstone with very few quartz pebbles.

At **K**, close to where the Fire Trail intersects the White Trail trending west, there is a ten-inch birch tree that appears to be growing out of a large rock slab (see photograph). A seed fell into the bit of soil material that existed in the fracture of the rock and started to grow. Seeking nourishment for the growth of the tree, the roots followed a fracture in the rock, and extended into the fertile soil. At the same time the tree root exerted enough power in its growth to force the solid rock to split apart. This demonstrates how plants are a part of the geological process of weathering by splitting rocks apart and aiding in their disintegration.

The Mill Creek area is in the northeast corner of the park. This is the only area within the park where good exposures of diabase may be found.

The boulders in this area are large, smooth, and dark gray in color. This igneous rock called ***diabase*** is composed chiefly of two minerals, labradorite and augite. The two minerals crystallized together as the rock cooled from a molten state.

If you follow the White Trail to the west, you will be walking among many large diabase boulders which are rather smooth and have at least one flat surface.

The diabase in this area is part of a large ***sill*** that outcrops near the Schuylkill River near Birdsboro and trends in a southeasterly direction along the northern border of the park, makes a sharp "U-turn" through the town of St. Peters, and trends in a westerly direction about two miles south of the park.

In the town of St. Peters, about one mile south of the park, there is a large quarry operated by the French Creek Granite Company. The quarry was opened in 1885 and the rock quarried is diabase. When polished, the diabase makes an attractive dark stone for ornamental and architectural use. The polished rock is known as "black granite."

There is a very large flooded and abandoned quarry on Six Penny Creek, a few hundred feet east of the entrance to the Six Penny picnic and swimming area. The southern wall of the quarry is over a thousand feet long and drops about 150 feet above the water. This is private property and an EXTREMELY HAZARDOUS area. This quarry produced diabase that was crushed and used for road building and construction purposes.

The French Creek Granite Company quarry and the abandoned quarry are part of the same large sill that makes a "U-turn" around the eastern end of the park and is found along Mill Creek in the northeast corner of the park.

The diabase sill had much influence on the early settlement and industry of the park area. Diabase is still quarried for building stone and crushed rock; it was also the basis for the iron mines that existed in the area and for the establishment of Hopewell Village and its iron furnace. When the diabase was molten, 180 million years ago, accompanying hot solutions that contained iron were deposited in the rock of the area. In the 18th Century, an iron mining and smelting industry was established here. The iron in the immediate park area has been mined-out but Bethlehem Steel Corporation discovered a large new iron orebody in 1948 near Morgantown about six miles west of the park. The mine commenced operations in 1961 and the ore is extracted from shafts over 3000 feet deep. The ore in the mine is related to the same diabase sill that cuts through the park.

The earliest iron mines in the area were pits or small quarries used to extract the rock containing the ore minerals limonite and magnetite. Remnants of old limonite pits may be found just north of the exit road from Group Tenting Area B (X on map), and in an area about one-half mile to the northwest. Another old limonite pit is located about 2000 feet south of the southwest corner of the park on Pine Creek.

The magnetite iron ores are richer in iron and were formed by the chemical action of the molten diabase lava on pre-existing rocks. There are two old magnetite ore mines about 2000 feet northeast of the quarry at St. Peters. These mines were opened in 1850 and one of them operated until 1928; the underground workings extended 485 feet below the surface.

At Warwick, two miles south of the park on Route 23, old, rust-colored banks may be seen on the south side of the highway. This is part of the remains of the Warwick Iron Mine which has been reported as opening in 1733; this mine must certainly have supplied ore to the Hopewell Village furnace.

About one and a half miles west of Warwick, on the State Game Lands, there is an "early" magnetite iron mine. This was known as the Hopewell Mine which was believed to have been working during colonial time, reopened during the late 1800's, and finally closed down in 1914.

About three miles southwest of the park, just south of Hopewell Road, and about three-quarters of a mile from Joanna, there are two large ponds which are the remains of an old magnetite mine. An abandoned magnetite pit also has been reported south of Hopewell Village (Y on map) where Horse-shoe Trail crosses the southern margin of Hopewell Village National Historic Site.

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**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF ENVIRONMENTAL RESOURCES**

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